
Original article**Epidemiologic study of onychomycosis and tinea pedis in Kashan, Iran****Mohammad Ali Asadi¹, Rouhollah Dehghani², Mohammad Reza Sharif³**¹*Department of Parasitology and Mycology, Kashan University of Medical Sciences, Kashan, Iran*²*Department of Environmental Health, Kashan University of Medical Sciences, Kashan, Iran*³*Department of Pediatric, Kashan University of Medical Sciences, Kashan, Iran***Received:** April 2009**Accepted:** June 2009

Abstract

Onychomycosis is a fungal infection of nails that caused by several dermatophytes and saprophytes (yeasts and moulds). In addition, tinea pedis is a fungal infection of feet due to dermatophytes. Due to the importance of high prevalence rate of above diseases, this study was conducted to determine the epidemiologic condition of diseases in Kashan. In the present study, 137 patients suspected to onychomycosis and tinea pedis were examined. Disease was confirmed in 26 subjects (18.9%), 11 were males and 15 were females. The common etiologic agents was yeasts (11 cases) followed by dermatophytes (9 cases) and saprophytes (6 cases). This study showed that there is a high prevalence rate of onychomycosis and tinea pedis in Kashan. Therefore, due to importance of the disease, it is necessary to diagnose and cure the disease immediately.

Keywords: Onychomycosis, Tinea pedis, *Candida*, Dermatophyte, Saprophyte**Introduction**

Onychomycosis is referred to all fungal infections of nail plate that caused by different species of dermatophytes, saprophytic moulds, yeasts and, yeasts like. Onychomycosis caused by dermatophytes is called tinea unguium [1]. Other accountable species for onychomycosis are yeast and yeast like fungi (ie, *Candida*, *Geotrichum candidum*, *Trichosporon beigelli*) and saprophytic fungi such as *Aspergillus*, *Scopulariopsis*, *Fusarium*, *Acremonium* and *Penicillium* [2]. Onychomycosis caused by non-dermatophytes are often diagnosed mistakenly with tinea unguium. The Disease is mostly prevalent among housekeepers in Isfahan, Iran [3]. Tinea pedis or Athlete's foot is the term used for a dermatophyte

infection of the soles and the interdigital spaces. *Trichophyton rubrum*, *T. mentagrophytes*, and *Epidermophyton floccosum* most commonly cause tinea pedis, with *T. rubrum* being the most common cause worldwide. *T. tonsurans* has also been implicated in children. Non-dermatophytes cause of the disease include *Scytalidium dimidiatum*, *S. hyalinum*, and, rarely, *Candida* species [1,3].

The prevalence rate of fungal infections is varied widely in the world. It is estimated that dermatophytosis are including 73.5% of 4000 fungal infections [4]. Fungal infections are not confined to developing countries and they are seen even in developed countries as USA. The prevalence rate of the disease is so high in USA has that the expense of noti-

fungal agents used for skin infections amounted to 409 million dollars during 16 years (25 million dollars yearly). The treatment expenses of dermatophytosis in the USA amounts to 40 million dollars in a year [5]. Due to its hot and humid climate and specific environment, existing some jobs such as animal husbandry with non-hygienic methods, which make direct contact of human to animals, and the unfamiliarity with how the disease may be acquired, Iran is among the countries where dermatophytosis is mostly prevalent [6]. The aim of present study was to determine the epidemiologic condition of onychomycosis and tinea pedis in Kashan.

Materials and methods

All participants examined by a dermatologist were suspected to have onychomycosis or tinea pedis. They were referred to the medical mycology laboratory, Golabchi, in Kashan. Skin scrapings and nail clippings were collected from patients. Samples were examined using KOH in direct smear. The presence of septate branching mycelium and arthroconidia confirmed tinea pedis. Yeast cells and pseudohyphae in nail clippings revealed onychomycosis due to yeasts. In addition, in direct smear of onychomycosis due to non-dermatophyte, septate branching mycelium were seen.

Samples were cultured on Sabouraud's dextrose agar (S) and Sabouraud's dextrose agar, containing chloramphenicol and cyclohexamid (SCC) at ambient temperature for 2-4 weeks. Dermatophytes were identified based on colony morphology, microscopic characteristics, and biochemical tests. In addition, saprophytic fungi were

detected by slide culture and *C. albicans* were detected using germ tube test and morphology on cornmeal agar.

Results

The study was carried out in Kashan from March 2001 to May 2003. Out of 137 examined patients, 53 were males and 84 were females. Fungal diseases were detected in 26 of 137 (19.0%) cases. Onychomycosis and tinea pedis were diagnosed in 17 (65.4%) and 9 (34.6%) of patients using direct and culture examinations (Table 1). Out of 26 affected patients, 11 (42.3%) were males and 15 (57.7%) females. In the present study 65.4% and 34.6% were lived in urban and rural region respectively.

Twenty-three cases were positive in direct examination and 26 cases developed in culture media. In the present study etiological agents consisted of nine dermatophytes cases (34.6%) including *T. violaceum* (3 cases), *T. mentagrophytes* (2 cases), *T. rubrum* (2 cases), *T. verrucosum* (1 case) and *E. floccosum* (1 case). In the current study *C. albicans* was accountable for 7 (63.6%) of 11 cases of the disease and the rest belonged to other species of *Candida*. Other saprophytes 6 (23.1%) including *Aspergillus flavus* in two cases, *A. fumigatus* in two cases, *Scopulariopsis* in one case, and *Fusarium* in one case (Table 2). In the present study 30.8% of patients were school student followed by housekeeper 19.2%, worker 15.4%, carpet-weaver 11.5%, high school student 3.9% and others 19.2%. The educational levels of patients were literate, primary school, secondary school, high school, and university degree.

Table 1: The sex distribution of patients with onychomycosis and tinea pedis

Mycosis	Male	Female	Total
Tinea unguium	5 (45.5%)	12 (80%)	17 (65.4%)
Tinea pedis	6 (54.5%)	3 (20%)	9 (34.6%)
Total	11	15	26

Table 2: The etiological agents distribution of onychomycosis and tinea pedis in examined patients

Fungal species	Male		Female		Total	
	No	%	No	%	No	%
<i>T. violaceum</i>	1	9.1	2	13.3	3	11.6
<i>T. mentagrophytes</i>	2	18.2	-	-	2	7.7
<i>T. rubrum</i>	1	9.1	1	6.7	2	7.7
<i>T. verrucosum</i>	-	-	1	6.7	1	3.8
<i>E. floccosum</i>	1	9.1	-	-	1	3.8
<i>C. albicans</i>	1	9.1	6	40	7	26.9
<i>Candida sp.</i>	-	-	4	26.6	4	15.4
<i>A. flavus</i>	2	18.2	0	6.7	2	7.7
<i>A. fumigatus</i>	1	9.1	1	6.7	2	7.7
<i>Scopulariopsis</i>	1	9.1	-	-	1	3.8
<i>Fusarium</i>	1	9.1	-	-	1	3.8
Total	11	100	15	100	26	100

Discussion

The study attempted to determine the prevalence rate and etiological agents of onychomycosis and tinea pedis among the patients referred to the mycology laboratory, Golabchi, in Kashan. Out of 137 patients having nail lesions, 17 had onychomycosis and nine tinea pedis. This finding is compatible with other studies performed in Iran and abroad [4,7-9]. In a study conducted by Hashemi *et al.* [10] dermatophytes were diagnosed in 21.3%, yeasts in 59.7% and non-dermatophytic moulds in 19% of onychomycosis. Also in another study conducted in Iran the prevalence rate of onychomycosis was reported 17% [11].

In the current study, dermatophytes were among the etiological agents in nine cases (34.6%), which is compatible with many studies. For example, in a study performed by Moqadami and Shidfar [12] in Tehran, dermatophytes were indicated as the etiological agents in 32%. Also in another study carried out by Shidfar [9], dermatophytes were pointed out as the agent for onychomycosis in 34.6%. In addition study performed by Chadeganipour *et al.* [13] in Isfahan, dermatophytes were as the main agent, which caused onychomycosis in 30%. In our study the most common agent of onychomycosis was *C. albicans* followed

by *Candida* species, *A. flavus*, *A. fumigatus*, *Scopulariopsis*, and *Fusarium*.

As a study carried out by Moqadami and Shidfar [12], it revealed that onychomycosis caused by *Candida* agents, particularly *C. albicans* in 66.4%. Other species were *C. parapsilosis*, *C. tropicalis*, and *C. guilliermondi*. The prevalence of tinea unguium and tinea pedis in the present study was 65.4% and 34.6% respectively.

Hot and humid weather precipitates the spread of the diseases. The shoes, which cover completely the feet, make the feet more susceptible to the disease and cause some damages to the superficial veins of the feet. Temperature and humidity are two important predisposing factors for tinea pedis. Tinea pedis occurs worldwide and is more prevalent in tropical countries. The prevalence of tinea pedis was higher in men than in women [14]. *T. violaceum* was the most common agent of tinea pedis in our study followed by *T. mentagrophytes*, *T. rubrum*, *T. verrucosum* and *E. floccosum*.

Tinea unguium and tinea pedis are two cutaneous fungal infections highly prevalent in the general population. Although these disorders are not serious in terms of mortality or physical and/or psychological sequelae, they have significant clinical consequences given their infectious nature, esthetic consequences, chronicity, and therapeutic difficulties.

Conclusion

This study showed that there is a high prevalence rate of onychomycosis and tinea pedis in Kashan. So due to importance of the disease, it is necessary to diagnose and cure the disease. It is recommended to fulfill further studies in this regard.

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